



4th International Conference on Global Business and Social Science 2021

4th International Conference on Global Business and Social Science 2021 (4th ICGBSS 2021) Global Academic Excellence (M)
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Paper Title : FARMERS DEPENDENCY IN THE POTATO SUPPLY CHAIN IN BATUR, CENTRAL JAVA,
INDONESIA
Date : February 03rd, 2021

NOTIFICATION OF PAPER ACCEPTANCE

Dear Mr. Bonifatius Junianto Wibowo,

On behalf of the 4th ICGBSS 2021 Committee, we are pleased to inform you that your submitted full paper (4th ICGBSS 2021: 014-014) entitled "FARMERS DEPENDENCY IN THE POTATO SUPPLY CHAIN IN BATUR, CENTRAL JAVA, INDONESIA", has been **ACCEPTED** for the conference. Congratulation!

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Again, thank you very much for your submission.

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FARMERS DEPENDENCY IN THE POTATO SUPPLY CHAIN IN BATUR, CENTRAL JAVA, INDONESIA

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Abstract

Potatoes are an agricultural commodity that is widely cultivated in Indonesia. One of the leading potato producing areas is Batur sub-district in Banjarnegara, Central Java. Although the Batur sub-district has potential in potato cultivation and business, most farmers in this area still follow the wholesaler's price. This condition happens according to the agreement made between wholesalers and farmers; after farmers obtain credit from wholesalers through collectors, they must obey wholesalers' policies. Moreover, farmers can also not know the potato market with certainty due to the limited mastery of market information, especially prices and added value to various actors in the potato supply chain. This study aims to: (i) describe how the potatoes supply chain in Batur, Banjarnegara; furthermore, the comparison of potato prices and value-added by distribution channel, (ii) discuss and analyze the causes of differences in potato market prices and value-added in distribution channels, (iii) recommend the appropriate potato distribution strategy. The data required include secondary and primary data. Secondary data were obtained from the Central Bureau of Statistics, Department of Agriculture. Meanwhile, primary data was obtained through a questionnaire from 20 potato farmers and traders from Wonoyoso, Sumberejo, Batur, and Grogol villages. Interviews were conducted with six potato farmer groups. The results showed that potato farmers were weak compared to other potato supply chain actors such as wholesalers, collectors, wholesale market traders in other provinces, retailers, MSMEs, factories, and exporters. The dependence of farmers on local wholesalers is quite substantial because wholesalers control potatoes' marketing network from upstream to downstream. The study recommendations are restructuring and improving cooperation performance and providing business loans with lower interest rates and fast processing. The Agro Cooperative will shorten the potato distribution channels and provides potato farmers with important information such as market information and business conditions

Keywords: Supply Chain, Potato Price, Value Added

Introduction

Potatoes, or commonly known as *Solanum Tuberasum*, are priority horticultural and food crops commodities to be developed in Indonesia. Potatoes are also a source of carbohydrates

that are widely consumed by people besides rice. According to Andriyanto, Setiawan, & Riana (2013), Indonesia's potato consumption has increased significantly from year to year. Increasing potato's demand needs better and continuous potato production. Figure 1 is the potato's production data.

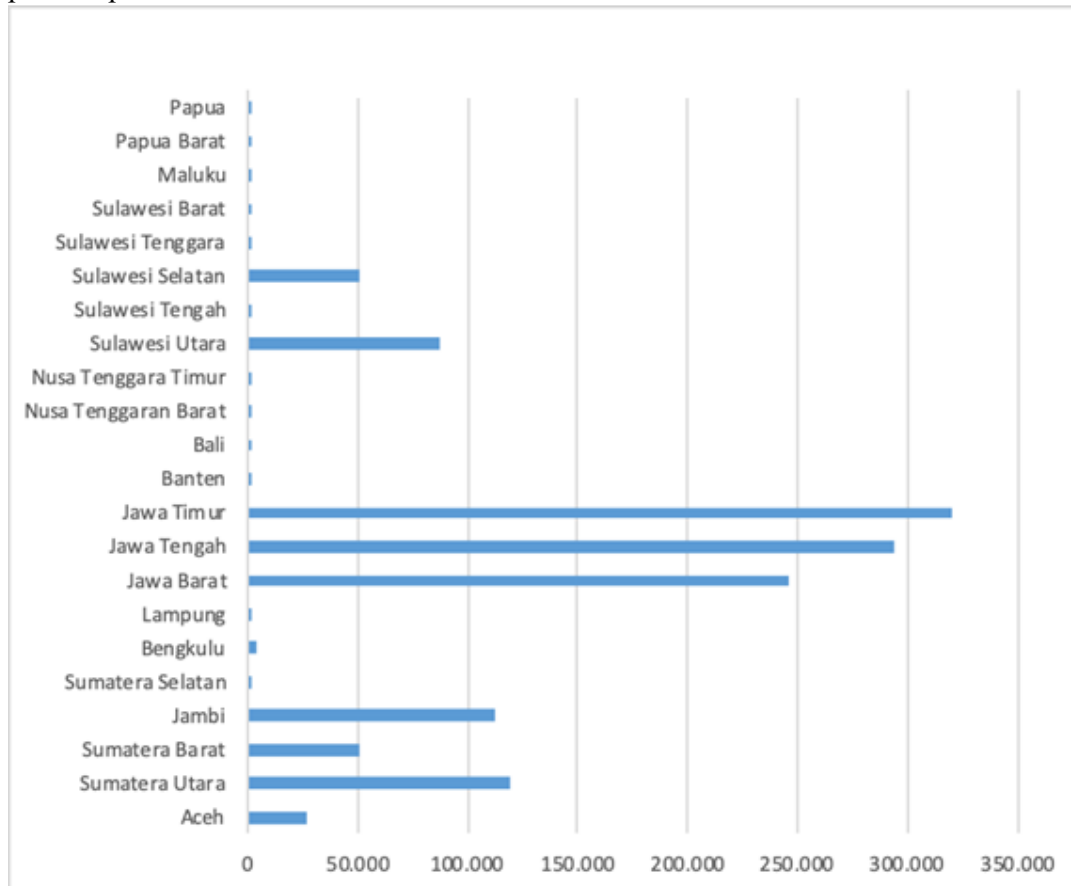


Figure 1. Potato Production by Province, 2019

Source: Agriculture Office, 2019

Of the 22 provinces, five of them are the largest potato producers. They are East Java, Central Java, West Java, North Sumatra, and Jambi provinces. Batur, Banjarnegara, Central Java is the region that produces the best quality potatoes. Batur area has an altitude of 1663 to 2093 meters above sea level, making it suitable for potato crops. Besides, the land in the district of Batur includes fertile "andosol" soils with the right sunlight intensity and sufficient rainfall. This favorable condition is supported by a potato seed development center's presence to make superior potato seeds. Potatoes from this area are widely used to produce fast food, potato chips, and various other snack foods (Sodhiq, 2020).

The total area of potato plants for the Batur sub-district is around 430 acres and spreads in Wonoyoso, Sumberejo, Batur, and Grogol (Central Bureau of Statistics of Banjarnegara, 2019). Batur and Wonoyoso villages have the largest potato crop areas, 228 acres, and 100 acres (table 1). The potatoes produced in these two villages were 1,644.65 tons for Batur village and 689.30 tons for Wonoyoso village, with a total production of 2,795 tons from all villages. The potatoes produced include Tejo M.Z., Granola, Tropika, and Butter

Potatoes (Sub Directorate of Horticultural Plants, 2017). Apart from being caused by area size, the number of plant populations also affects the amount of potato production produced (Mastuti, 2014). The sizeable potato production is related to the Batur sub-district, designated as the center for potato production (Mastuti, 2017).

Table 1. Planted Area, Potato Production and Productivity in 2019

Sub-District	Land Ownership Data (Acres)	Population (Plant)	Production (Ton)	Productivity (Ton/Acres)
Wonoyoso	100	954.000	689,30	6,89
Sumberejo	49	468.000	379,50	7,75
Batur	228	2.178.000	1.644,65	7,21
Grogol	53	504.000	81,69	1,54
Total	430	4.104.000	2.795,00	6,50

Source: Central Bureau of Statistics of Banjarnegara, 2019

From the level of productivity, it turns out that Sumberejo Village has the highest level of potato productivity, in the amount of 7.75 tonnes per acre. This condition happens because of smooth irrigation, better sunshine, more fertile agricultural land, and infrequent pest attacks. On the other hand, the lowest level of potato productivity was found in Grogol, at 1.54 tonnes per acre. This condition happened because the village of Grogol was in a basin so that the falling fog was trapped, and it was not easy to move. This condition results in late blight, which impacts decreasing the quality of the potato plant so that the potato yield loss reaches 50% (Rukmana, 2012). Also, the water used for irrigating potato plants is not smooth, and there are plant pests.

In advancing their business, potato farmers form farmer groups. The farmer groups' tasks include conducting regular meetings to compile a potato cultivation program, holding outreach in cooperation with the agricultural agency and business groups, and working together in planting and maintaining potato crops until harvest. Apart from working through farmer groups, promoting potato business is also done through agro cooperatives, whose members consist of potato farmers. The cooperative tasks include receiving savings and providing loans to farmers even though the interest is relatively high. The cooperative also provides potato production facilities such as fertilizer, medicines, agricultural equipment, and accommodates potato chips produced by potato farmers.

In marketing potatoes, wholesalers set the price of potatoes from farmers. This condition happens because it has something to do with the bonded bond system, an agreement made between large traders and farmers. In the agreement, through collector traders, wholesalers provide credit to farmers to finance the cultivation of potato crops up to harvest. These farmers also use this credit to pay for their daily needs. When the harvesting season comes, the farmers should hand over their potatoes to the wholesaler.

Moreover, farmers cannot control the potato market due to the lack of market information controlled. On the other hand, farmers also do not know the price, added value, and profitability of various actors in the potato supply chain. This phenomenon is under the research results by Miftah, Arti, & Rivanda (2019), which states that traders have set the price of potatoes received by farmers. Thus farmers cannot enjoy a profitable potato price when the potatoes are distributed to retailers. The same thing is evidenced by Kaido &

Fuyuki (2020) 's research results, which show that the distribution of prices, added value, and profits from the distribution of pineapples from various parties involved in it are not the same. This condition is detrimental to farmers as producers of agricultural products.

Besides being marketed to various regions, potatoes are also sold by collectors to micro, small and medium enterprises (MSMEs) or Home Industry, especially around the Batur. The potatoes are processed into chips, donuts, potato cream soup, and potato wedges. The problem faced by potato farmers is that farmers have not been able to correctly determine the price of potatoes. Most of them also do not know the market price of potatoes sold by traders in other cities, either in one province or another, and sold by exporters. On the other hand, the price of potato-based processed products currently circulating in the market is not specific. The added value obtained from all potato business actors other than farmers is relatively high. Based on this phenomenon, this study aims to (i) describe how the potato supply chain is in the Batur, Banjarnegara. Furthermore, this study also explains the comparison of potato prices and value-added by distribution channel; (ii) discuss and analyze the causes of differences in potato market prices and value-added distribution channels; (iii) recommend the appropriate potato distribution strategy.

Literature review

Supply Chain

In the agricultural sector, agricultural commodities' distribution starts from farmers, distributors, retailers to consumers (Heizer & Render, 2014). These activities represent a coordinated chain, starting from farmers to consumers. This phenomenon is in line with Cooper et al. in Somashekhar, Raju, & Patil (2014), which explains that the distribution of a product, including agricultural commodities, starts with production by farmers, then is followed by distribution and marketing activities so that agricultural commodities reach consumers.

Value Added

Unlike in developed countries, in developing countries, the marketing of agricultural commodities is more complex, and the costs involved are quite large. This fact is in line with Somashekhar, Raju, & Patil (2014) research results, which show that agricultural marketing in India. India's agricultural marketing is characterized by fragmented supply chains, large losses during post-harvest, high transaction costs, many market intermediaries, lack of awareness, and other socioeconomic factors. The results of research conducted by Kaido & Fuyuki (2020) show that the distribution of pineapples from the Muaro Jambi district to various regions causes different prices, added value, and benefits to the various parties involved. This condition is related to the condition of the pineapples sale. Large, unripe pineapples are sold to wholesalers, while ripe pineapples of low quality are sold to intermediaries. Miftah, Arti, & Rivanda (2019) stated that long-lasting vegetables in the city of Bogor include potatoes imported from remote locations.

The Price of Agricultural Commodity

Meanwhile, the traders set the price of potatoes received by farmers. This situation shows that if farmers are very weak in determining potatoes' price, they obey and stick to the trader's price of potatoes. The consequence is low profitability because farmers have to cover all costs incurred, including the price of seeds, maintenance costs, pesticides, labor costs, and transport costs. Meanwhile, Rosmawati (2015) explained that in Ujan Mas village, Dempo Utara sub-district, Pagar Alam city, Bengkulu, there had been a decline in potato production.

This condition is caused by many farmers who have switched to business coffee, which is considered more profitable. Farmers considered switching to the coffee business because the capital they spent was relatively lower than that of the potato business. From the agricultural input, the price of potato seeds is relatively high. The quantity and quality of potato seeds are not right, and the limited labor causes a decrease in potato production.

Research methods

The research was conducted in Batur, Banjarnegara, Central Java. The reason for choosing the location is because this area is a large potato producing area. Besides, the potatoes produced are the best potato among potatoes produced from other regions in Indonesia. This study uses secondary data and primary data. Secondary data were obtained from the Central Bureau of Statistics, Department of Agriculture. Meanwhile, primary data were obtained through questionnaires and interviews. The questionnaire was distributed to 20 potato farmers and traders in Wonoyoso, Sumberejo, Batur, and Grogol villages to find out in-depth the marketing of potatoes produced by potato farmers, mostly related to distribution, price, and costs. Interviews were conducted with six potato farmer groups to find out about planting, maintenance, and harvesting activities and problems faced. Analysis of the potato supply chain is conducted to determine the selling price and added value of the potato supply chain actors involved. The added value is obtained from the difference between the selling price and each actor's purchase price. Furthermore, based on the selling price and added value, a qualitative analysis is carried out to determine the various things that cause a difference in price and added value.

Results and Discussion

Potato Supply Chain in Batur

Data description and analysis, starting with various parties involved in potato marketing, consisting of potato farmers, collectors, wholesalers, home industry or MSMEs, factories, exporters, wholesale market traders in other provinces, and retailers. There are five distribution systems in potato marketing in the Batur; they are:

1. Distribution Channels I: Potato farmers sell the harvested potatoes to collector traders, then collectors sell them to home industries (MSMEs).
2. Distribution Channels II: Potato farmers sell the harvested potatoes to collectors, then the potato collectors sell them to wholesalers, then the wholesalers sell the potatoes to exporters.
3. Distribution Channels III: Potato farmers sell the harvested potatoes to collectors, then the potato collectors sell them to wholesalers, then the potato wholesalers sell them to traders in wholesale markets in other provinces, and then resell them to retailers.
4. Distribution Channels IV: Potato farmers sell their harvested potatoes to wholesalers from other cities in Central Java, and then by wholesalers, the potatoes are sold to retailers.
5. Distribution Channels V: Potato farmers sell potatoes to collectors through farmer groups, then the potato collectors sell them to factories.

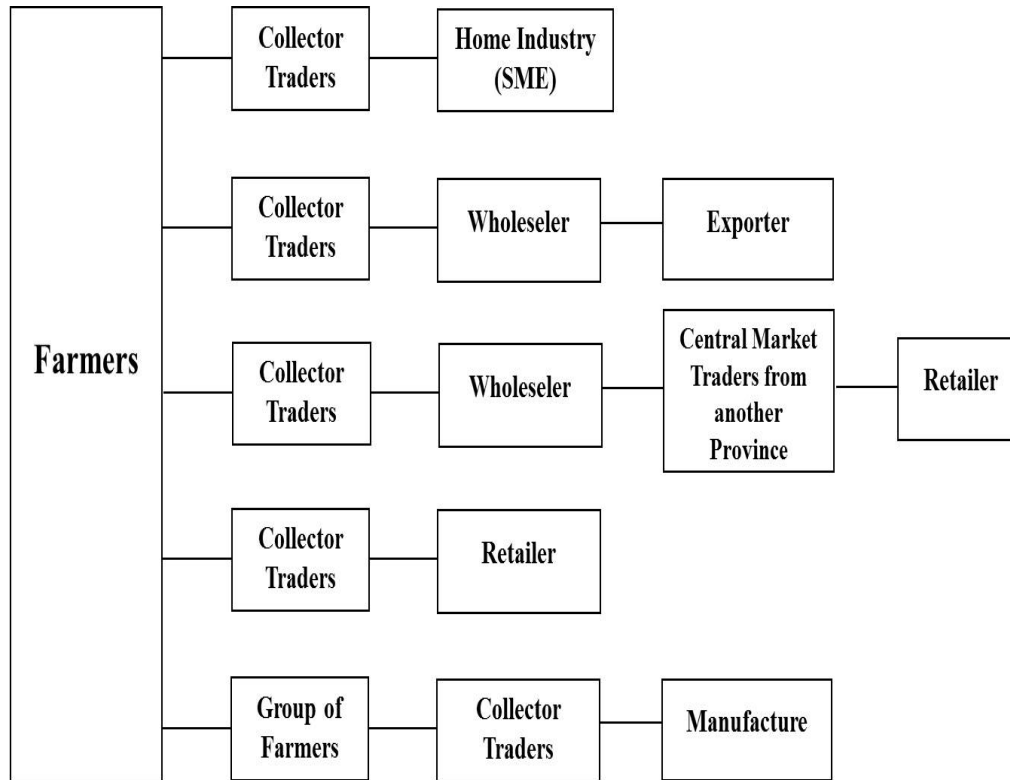


Figure 2. Distribution System of Potatoes in Batur Sub-District

Source: Interview with Potato Traders 2019

Comparison of Potato Prices Based on Distribution Channels

Price comparisons based on the distribution channels of parties in the potato supply chain vary, as shown in figure 3:

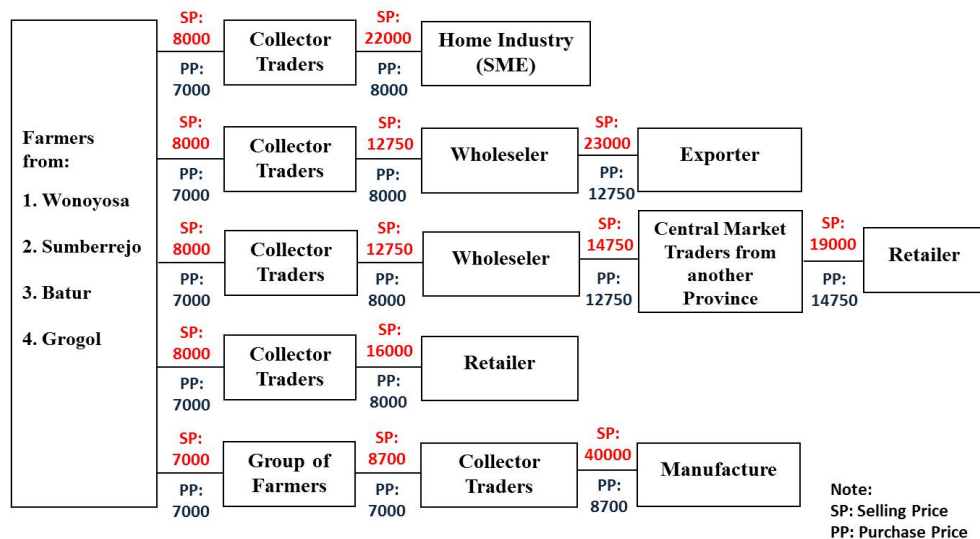


Figure 3. Price comparisons based on the distribution channels

Source: Interview with Potato Traders 2019

Figure 3 shows that the price of potatoes from farmers from Wonoyoso Village, Sumberejo Village, Batur Village, and Grogol Village is an average of IDR 7,000 per kg. The next route is collecting traders. Collector traders sell potatoes for IDR 8,000, and large traders in other cities sell for a difference of IDR 500 more expensive. The next route shows that wholesalers and MSMEs (Home Industry) buy potatoes from collectors at IDR 8,000. Local wholesalers sell potatoes at IDR 12,750, while MSMEs can sell at IDR 22,000. This situation is also due to the processing costs of raw potatoes into semi-finished potatoes ready for consumption. Prices at the traders and exporters level tend to be higher. Main Market Traders from Other Provinces and Potato Exporters obtain potatoes by buying potatoes from Local Wholesalers with a price range of IDR 12,750. Whole market traders from other provinces sell for IDR 14,750, while exporters can sell up to IDR 23,000. The same thing happened to retail traders in other cities in one province to buy potatoes from wholesalers from other cities at IDR 8,500 and sell them for IDR 16,000 to consumers. The same is the case with retail traders in other provinces. They buy potatoes from wholesale market traders from other provinces for IDR 14,750 and sell them for IDR 19,000. The highest sales were obtained at the factory level, where the product was processed potatoes, the raw material of potatoes purchased from collectors at a partnership price of IDR 8,700 and sold for IDR 40,000.

Value Added Comparison by Distribution Channels.

The added value among actors in potato distribution is not the same. This value can be seen from the comparison of added value based on distribution channels as in table 2.

Table 2. Value Added Comparison by Distribution Channels

Parties to the Potato Supply Chain	Group of Potatoes	Value Added
Collector Traders	Consumption	12,50%
Local Wholesaler	Consumption	37,25%
Wholesaler from another city	Consumption	17,65%
Central Market Traders from another Province	Consumption	13,56%
Home Industry	Consumption	63,64%
Exporter	Consumption	44,57%
Retailer from another province	Consumption	22,37%
Retailer from another city in the same province	Consumption	50,00%
Manufacture	Consumption	78,25%

Source: Questionnaire, 2019

Table 2 shows that the most considerable added value of potatoes is the added value obtained by the factory, which is equal to 78.25%. The home industry is 63.64%, retail traders in one province are 50.00%, exporters are 44.57%, and local wholesalers 37.25%. The added value at the factory and MSME levels shows that the processed food products made from potatoes have a high value. This condition is inseparable from the increasing public demand for processed foods made from potatoes in various big cities, small cities, and villages. At the level of retail traders in one province, the added value of potatoes is also considerable, indicating that public demand, especially among homemakers in various cities in Central

Java, is quite large. Public awareness of the importance of eating vegetables is getting higher amid the spread of various fast foods. Most of the potatoes are imported from potato farmers through wholesalers in each city. Meanwhile, the exporter level is added value is mainly in line with the increasing demand for potatoes from various countries. Initially, the export destination countries for potatoes were only a few countries in Asia. Now the export has increased to various countries such as Malaysia, South Korea, Papua New Guinea, Hong Kong, Singapore, Taiwan, Thailand, Australia, Austria, Bangladesh, Cameroon, China, East Timor, Japan, India, Maldives, New Zealand, and Qatar. At the local wholesaler level, the significant value-added shows that the demand for potatoes from the community, especially from wholesale market traders, originates from Central Java, West Java, Lampung, West Kalimantan, and DKI Jakarta. Likewise, exporters also tend to increase. So far, wholesalers have good relations with all the potato supply chain actors, including wholesale market traders in other provinces and with exporters.

Analysis of the Causes of Difference in Price and Value Added in Distribution Channels.

Based on the description above, it is clear that there are differences in prices between distribution channels. At the farmer level, the selling price of potatoes is the price that has been set by the wholesaler. In Indonesia, the wholesaler is also known as “pengijon” (traders who buy before the harvest of potatoes). Through collector traders, Wholesalers have a stake in helping farmers in financing related to land rental costs, land management, procurement of seeds, procurement of fertilizers, medicines for pest and plant disease management. Assistance to finance farmers' businesses is in the form of loans, the repayment of which is calculated from the sale of potatoes. The difference between farmers' purchase price and the selling price is due to the extreme and challenging terrain, road to land infrastructure, and inadequate and remote cultivation. Some still need transport laborers, with high costs, and the mode of transportation used is only capable of carrying capacity. A little, so it must be shaded several times. Meanwhile, the price difference between the purchase price and the selling price is due to the cost of harvesting, washing costs to clean potatoes from the ground, location conditions, road access, distance to the market, and transportation modes. Higher prices at wholesalers are due to transportation costs, cost of lowering potatoes, cost of sorting and grading (tuber classification), based on super quality class: > 400 g (consumption bulbs), quality A: > 250g - 400 g (consumption bulbs), quality B: > 100 g - 200g (consumption bulbs). For exporters, apart from these costs, there are still other costs that must be incurred, such as quarantine costs, container costs, cold storage costs, insurance costs, certification fees, export-import taxes, and unexpected costs. This condition results in higher prices for potatoes sold to other countries.

The price difference between MSMEs and factories is because potatoes have become a processed product. From the interview results, the MSME distribution channel, even though the processing is manual and the packaging is still simple, the costs incurred are quite large. The costs of using supporting materials, labor costs, storage costs, transportation are relatively high. So MSMEs process the potatoes as a home Industry will sell potatoes at a high price. The price difference is striking at the factory because the potatoes sold to consumers have been processed into processed products that are ready to eat by processing using machines and are all hygienic and have been packaged. This processing requires many costs, such as storage costs, costs for supporting materials, labor costs for production, transport costs, and marketing costs. Also, changes in people's lifestyles that increasingly prefer potato-based food products such as fast food, pasta, and other food types have driven

an increase in demand for these potato-based foods. From the description of added value, there is also a difference. The added value is enormous at the factory and home industry level because they can implement high production efficiency. This condition shows the use of a center fuse, which is an oil filter that causes the product to dry out quickly. This equipment has prompted the company to produce various variants of potato-based products that are very salable in the market.

On the other hand, the purchase price of potatoes from collectors is meager compared to the value of processed potatoes sold in the market. The transportation cost expenditure is also relatively low, especially in the procurement of potatoes. This condition is because most of the potatoes are delivered directly by collectors. Meanwhile, at the retail level in one province, the added value is mostly due to increasing demand and exceeds the supply. This phenomenon is related to changes in a healthy lifestyle so that many people use potatoes as a substitute for rice. Also, some retailers already have regular customers who obey and always follow the retailer's price (market of place).

Another thing that determines the amount of added value at the retail level is market sentiment, which is volatile and tends to rise. At the exporter level, the gains in added value are also quite large due to the fluctuating and increasing trend of the foreign exchange rate, increasing the selling price of potatoes in rupiah. On the other hand, government policies that reduce export duties and eliminate Letter of Intense fees related to processing product invoices and export quotas have boosted exports, including potato exports. The price of potatoes and the added value of selling potatoes outside of potato farmers seem very profitable, but potato farmers do not yet enjoy it. This opportunity cannot be exploited because potato farmers still rely on wholesalers and collectors for potatoes' pricing and marketing. The consequence is that there is a risk that must be borne by potato farmers in the potato supply chain. It changes in potato prices that can occur every time. If the potatoes' market price decreases, the wholesaler will ask the potato farmers to hand over their harvested potatoes at a lower price. Potato farmers cannot escape, even though the costs incurred are increasing. This condition is following the results of research conducted by Pujiharto & Wahyuni (2018), which shows that, in general, vegetable farmers in the Dieng Plateau have not been able to implement a marketing strategy through pricing. Besides, potatoes' shrinking nature encourages farmers to immediately sell them to wholesalers through intermediate traders to earn income quickly. Thus, the potato farmer can use his income for his family's needs, repaying business credit, and financing the next potato business. The respectful attitude of potato farmers was increasingly evident by several large traders' appointment as cooperative managers, which led to a stronger position of the wholesaler in the potato supply chain. The strategy undertaken by the cooperative management is to condition the cooperative so that it does not carry out several activities that can harm local wholesalers (table 3).

Table 3. Activities that have not been carried out by Agro Cooperatives

Not yet accommodating and marketing the potato harvest from potato farmers
Not yet providing agricultural business loans with low-interest rates
Not yet processing potatoes into high value-added food products.
Not yet providing useful market information for potato farmers

Source: Questionnaire, 2019

In the condition that the Agro cooperative has not yet carried out several activities, the local wholesalers intensively collect the potato harvest from farmers through collector traders for further resale. Meanwhile, wholesalers' business credit to potato farmers has a slightly lower interest rate and a fast process. Likewise, collector traders as business partners of wholesalers can freely sell potatoes from farmers to MSMEs and factories. Meanwhile, the information given to potato farmers is minimal only on certain things such as production technology, superior seeds, climate change.

Conclusions and Recommendations

Based on the analysis and discussion results above, it can be concluded that potato farmers are in a weak position compared to collectors, wholesalers, traders in the primary market in other provinces, retailers, MSMEs, factories, and exporters in the potato supply chain. Potato farmers are very dependent on wholesalers because wholesalers control the potato marketing network from upstream to downstream. The wholesaler's position is in the middle between the farmer and the collecting trader. The wholesaler is in the primary market in other provinces. The exporter and the retailer are also established. Potato farmers always follow various policies made by wholesalers through collector traders to maintain their business continuity. Besides that, potato farmers also depend on collector traders to distribute their harvested potatoes to home industries and factories. Potato farmers are not fully aware that potatoes can be processed into various high value-added food products. So far, agro cooperative services for potato farmers are still not optimal. It is proven that many farmers have not been served directly by the credit union.

Most of the farmers are served by large traders because, so far, the farmers have objected to meeting the cooperative requirements. Farmers who get capital from large traders are only farmers who have good relations with large traders. Meanwhile, other farmers felt that they received different treatment, especially regarding the procurement of seeds, production facilities, and market opportunities. Based on the conclusions, the recommendation is that agro cooperatives restructure various efforts to improve cooperatives' performance, which have not been evenly served, especially in savings and loan services. A policy of providing business credit with a lower interest rate and fast processing needs to be realized. Farmers can finance their business with efficient business costs.

On the other hand, cooperatives need to form productive business units. These business units include a production unit that processes potatoes from potato farmers into high value-added food products. This marketing unit handles the marketing of potatoes produced by farmers and processed products made from potatoes. The cooperative should shorten the potato distribution channel by accommodating the potatoes produced by potato farmers, sold to retailers, exporters, and wholesalers at wholesale markets in other provinces. However, this should not be deterred from local wholesalers' role because they are also in charge of the Agro cooperative. This situation means that there is a division of territory between potato farmers through cooperatives and large traders. The territory's division is intended to make it easier to find buyers and avoid fighting over buyers who are already customers. Zoning will also facilitate business facilities preparation, obtaining the necessary seeds and market information, counseling, and training. Thus, potato farmers and wholesalers both benefit so that excellent cooperation can be established. Providing critical information to potato farmers through credit unions must be done frequently, especially on the market and business conditions of vegetables, especially potatoes, both at the national and global levels. It is intended that potato farmers can keep up with external changes affecting their business to continue, and potato farmers are not disadvantaged.

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